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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/847,138	05/02/2001	Benoit R. Veillette	US010232 (7790/28)	6568
24737	7590	11/03/2004	EXAMINER	
PHILIPS INTELLECTUAL PROPERTY & STANDARDS P.O. BOX 3001 BRIARCLIFF MANOR, NY 10510			GARCIA OTERO, EDUARDO	
			ART UNIT	PAPER NUMBER

2123

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

08

Office Action Summary	Application No. 09/847,138	Applicant(s) VEILLETTE, BENOIT R.	
	Examiner Eduardo Garcia-Otero	Art Unit 2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2001, and 1/14/02.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION: Non-Final (first action on the merits)

Introduction

1. Title is: METHOD AND SYSTEM FOR OPTIMIZATION OF APODIZATION CIRCUITS.
2. First named inventor is: VEILLETTE.
3. Claims 1-22 have been submitted, examined, and rejected.
4. US nonprovisional application filed 5/2/2001, and no earlier priority is claimed.

Index of Important Prior Art

5. Abboud refers to US patent 5,647,365.
6. Dolazza refers to US patent 5,905,692.
7. Smith refers to "HDL Chip Design" by Douglas J. Smith, Doone Publications, 1996, ISBN 0-9651934-3-8, pages 2-19.

Definitions

8. "**Apodization**" is defined as "[ELECT] A technique for modifying the response of a surface acoustic wave filter by varying the overlap between adjacent electrodes of the interdigital transducer. [OPTICS] The modification of the amplitude transmittance of the aperture of an optical system so as to reduce or suppress the energy of the diffraction rings relative to that of the central Airy dis. [SPECT] A mathematical transformation carried out on data received from an interferometer to alter the instrument's response function before the Fourier transformation is calculated to obtain the spectrum" by McGraw-Hill Dictionary. The McGraw-Hill Dictionary of Scientific and Technical Terms, Fourth Edition, by McGraw-Hill Companies, Inc., ISBN 0-07-05270-9, 1989. As discussed below, it is not clear which variation (if any) of the McGraw-Hill Dictionary definition is intended by the Applicant.
9. "**Multiplier**" is defined as "In computing, an electronic device independent of the central processing unit (CPU) that performs multiplication by adding the multiplicand according to the value of the digits in the multiplier" by MS Dictionary. Microsoft Computer Dictionary, Fourth Edition, by Microsoft Press, JoAnne Woodcock as Senior Contributor, ISBN 0-7356-0615-3, May 1999.
10. "**Multiplexer**" is defined as "A device for funneling several different streams of data over a common communications line. Multiplexers are used either to attach many communication

lines to a smaller number of communications ports or to attack a large number of communications ports to a smaller number of communications lines. Acronym: MUX” by MS Dictionary. Microsoft Computer Dictionary, Fourth Edition, by Microsoft Press, JoAnne Woodcock as Senior Contributor, ISBN 0-7356-0615-3, May 1999.

11. **“Optimization”** is defined as “[MATH] The maximizing or minimizing of a given function possibly subject to some type of constraints. [SYS ENG] 1. Broadly, the efforts and processes of making a decision, a design, or a system as perfect, effective, or functional as possible. 2. Narrowly, the specific methodology, techniques, and procedures used to decide on the one specific solution in a **defined set of possible alternatives** that will best satisfy a selected criterion. Also known as system optimization.” by McGraw–Hill Dictionary of Scientific and Technical Terms, Fourth Edition, page 1329, 1989. Emphasis added.
12. **“Simulate”** is defined as “[ENG] To mimic some or all of the behavior of one system with a different, dissimilar system, particularly with computers, models, or other equipment”, according to McGraw-Hill Dictionary of Scientific and Technical Terms, Fourth Edition, page 1737, 1989.
13. **“Simulation”** is defined as “the imitation of the operation of a real-world process or system over time. Simulation involves the generation of an artificial history of the system and the observation of that artificial history to draw inferences concerning the operating characteristics of the real system that is represented. Simulation is an indispensable problem-solving methodology for the solution of many real-world problems. Simulation is used to describe and analyze the behavior of a system, ask what-if questions about the real system, and aid in the design of real systems. Both existing and conceptual systems can be modeled with simulation.” by The Handbook of Simulation, Jerry Banks, 1998, pages 3-4.
14. **“Spatial”** is defined as “of or relating to space... occupying space; involving relations in space” by Webster. Webster’s Third New International Dictionary, Merriam-Webster Inc, copyright 1993. Note that “spatial” means the same as “spacial”.
15. **“Transducer”** is defined as “A device that converts one form of energy into another. Electronic transducers either convert electric energy to another form of energy or convert nonelectric energy to electric energy” by MS Dictionary. Microsoft Computer Dictionary,

Art Unit: 2123

Fourth Edition, by Microsoft Press, JoAnne Woodcock as Senior Contributor, ISBN 0-7356-0615-3, May 1999.

Drawings and Specification-objections

16. The Drawings and Specification are objected to as being replete with errors. Some examples are provided:
17. Throughout the specification and FIGs and claims there appears to be some confusion regarding “multiplier” in contrast to “multiplexer”. Note the definitions provided above. Additionally, there appears to be confusion regarding “spatial window” in contrast to “temporal window”. Detailed discussion below:
18. FIG 1 should be labeled as “Prior Art”. Note Specification page 4 admits “Typically, an ultrasound system can provide a pressure field with electronically adjustable focus, distance, and direction”. FIG 1 appears to be merely focusing by delaying some of the pulses, or changing the phase delay. This is admitted prior art (and standard) phased array focusing.
19. Regarding FIG 2, Specification page 5 states “A channel-specific delay can be added 206”, but only an adder (a circle with a plus sign inside) is shown in the FIG. No delay is shown being input into the adder. Possibly it is not proper to use said adder symbol for adding a delay, because it is a phase delay addition, and not really a pure mathematical addition.
20. Also in FIG 2, Specification page 5 does not reference element 260 (a circle with a multiplication sign inside). The purpose of element 260 is not clear. Note that said element occurs twice in FIG 2. Specification page 7 states “multipliers 260”. It would be more clear if all the elements of FIG 2 were introduced in one location of the Specification.
21. Further in FIG 2, element number 215 is used as for a transducer in the transmit circuit 220, and also in the receiving circuit 230. According to the MS Dictionary, “Electronic transducers either convert electric energy to another form of energy or convert nonelectric energy to electric energy”. However, the Examiner objects to using the single element 215 to refer to both types of transformations in a single figure. The transducer 215 of the transmit circuit 220 apparently converts electrical energy into physical (pressure or ultrasound) energy. In contrast, the transducer 215 of receive circuit 230 apparently converts physical energy into electrical energy. Thus, while the term transducer can have two separate meanings, it is not good practice to use both meanings in the same FIG. The Examiner

Art Unit: 2123

suggests “215A” for the transmitting circuit transducer (physical energy output), and “215B” for the receiving circuit transducer (physical energy input).

22. In FIG 3A, the Specification page 6 states “full multiplier 301” and FIG 3A shows the symbol of a circle with a multiplication sign inside.
23. However, in FIG 3B, the same symbol of a circle with a multiplication sign inside is called a “reduced precision multiplier 330” at Specification page 7. Thus, the same symbol appears to have different meanings in FIG 3A and FIG 3B.
24. Also in FIG 3B, there appears to be a single line (possibly a control line) coming down from the top of the figure, then splitting, then routing to said circle with a multiplication sign inside, and also routing to the top of what appears to be a demultiplexer at the right side of FIG 3B. This implies that the applicant may intend a multiplexer (not a multiplier) at the left hand side of FIG 3B.
25. Further, in FIG 3B, the entire circuit is identified at Specification page 7 as “a floating point multiplier 305”. The logical interactions between the “floating point multiplier” and “reduced precision multiplier” and “variable shift unit” are not clear, and appear inconsistent.
26. Regarding FIG 4, Specification page 8 states “window 410” at line 3, then inconsistently states “window 415” at two other places in page 8.
27. Also regarding FIG 4, Specification page 8 states “quantized window 450”, but no such element 450 is numbered in the FIG 4.
28. Specification page 5 defines window as “A window may be any function that has a finite non-zero length”. Apparently referring to the “temporal window or envelop” in the previous sentence.
29. Also at Specification page 5, the term “may have a raised cosine temporal window or envelop” is not clear. Note that page 7 states “a raised cosine signal” and states “a raised cosine SNR ratio of 78.8 dB”. Note that SNR apparently is an acronym for signal-to-noise-ratio.
30. Specification page 6 states “the limited number piezoelectric elements creates spatial window”. Specification page 1 states “technique called apodization where the amplitude of the pulse at each transducer is set according to a spatial window”. The logical relationship

Art Unit: 2123

between the “spatial window” at page 6 and at page 1 is not clear. These do not appear to be the same spatial window.

31. Specification page 7 states “a quantization error can be purposely colored”. Please clarify the meaning of this statement.
32. Specification page 8 confusingly states “a window 410” referring to a nonperiodic waveform or pulse in FIG 4. Possibly it would be more clear to state “a temporal envelop 410”, in order to contrast with the entirely different spatial window created by the piezoelectric elements.
33. Specification page 8 states “smallest error power”, and is not clear. Please clarify.
34. In FIG 5, there appears to be a logical error. Element 515 appears to improperly terminate or “dead end”. In view of Specification page 9, it appears that element 515 should flow to element 520.
35. Thus, the Specification and the FIGs are replete with errors. The Applicant should correct the above, and then carefully review and correct any additional errors.

35 USC § 112-Second Paragraph-indefinite claims

36. The following is a quotation of the second paragraph of 35 U.S.C. 112: The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
37. **Claims 1-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite** for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
38. Claims 1-22 are indefinite due to the numerous errors and inconsistencies in the Specification and FIGs, as listed above in the section labeled “Drawings and Specification-objections”.
39. Note that over a dozen specific errors and inconsistencies are listed above. Additional specific sources of indefiniteness are provided below for individual claims.
40. In claim 1, the term “apodization” is not clear. Specification 1 states “technique called apodization where the amplitude of the pulse at each transducer is set according to a spatial window” at Specification page 1. Applicant’s definition is not clear, and does not appear to match any of the McGraw-Hill Dictionary definitions. There appears to be confusion between the spatial windows and the temporal windows.

Art Unit: 2123

41. Also in claim 1, the term “multiplier” is not clear. The Specification and the FIGs have discussed many types of multipliers, and some multipliers appear to be subsets of other multipliers. Please clarify.
42. In claim 2, the term “selecting” is not clear. For example, Specification page 8 states “smallest error power” which is not defined.
43. In claim 5, the term “compatible” is not clear.
44. In claim 6, the term “the selected apodization circuit” is not clear. Claim 6 depends from claim 1, which does not provide antecedent basis for “the selected apodization circuit”. Possibly the Applicant intends for claim 6 to depend from claim 2, wherein claim 2 does provide antecedent basis. Please amend appropriately.
45. Also in claim 6, the term “noise shaping technique to the window function” is not defined.

Claim Rejections - 35 USC § 112- first paragraph-written description

46. The following is a quotation of the first paragraph of 35 U.S.C. 112: The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.
47. **Claims 1-22 are rejected under 35 U.S.C. 112, first paragraph**, as containing subject matter which was not described in the disclosure in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.
48. The specification does not adequately describe claims 1-22 due to the numerous errors and inconsistencies in the Specification and FIGs, as listed above in the section labeled “Drawings and Specification-objections”. Note that over a dozen specific errors and inconsistencies are listed above.

Claim Rejections - 35 USC § 103

49. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action: (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

Art Unit: 2123

invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

50: The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: Determining the scope and contents of the prior art. Ascertaining the differences between the prior art and the claims at issue. Resolving the level of ordinary skill in the pertinent art. Considering objective evidence present in the application indicating obviousness or nonobviousness.

51. Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable.

52. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abboud in view of Smith.

53. Independent claim 1 is a “method” claim with 3 limitations, numbered by the Examiner for clarity.

54. In claim 1 limitation 1, “an apodization circuit” is disclosed by Abboud Abstract “Apodization”.

55. In claim 1 limitation 2, “replacing a multiplier with the apodization circuit with a first replacement multiplier” is disclosed by Abboud FIG 5 “MULTIPLIER”.

56. In claim 1 limitation 3, “replacing a window function of the apodization circuit with a first replacement window function” is disclosed by Abboud Abstract “window algorithm”.

57. Abboud does not expressly disclose “replacing” portions of “method” claim 1.

58. In claim 1, the term “replacing” is disclosed by Smith page 19 “optimize” in Figure 1.14 “RTL synthesis internal translation and optimization processes”. Also see Smith page 7 Figures 1.3 and 1.4 showing the iterative nature of circuit design.

59. Note that “optimization” is defined as “[MATH] The maximizing or minimizing of a given function possibly subject to some type of constraints. [SYS ENG] 1. Broadly, the efforts and processes of making a decision, a design, or a system as perfect, effective, or functional as possible. 2. Narrowly, the specific methodology, techniques, and procedures used to **decide on the one specific solution in a defined set of possible alternatives** that will best satisfy a selected criterion. Also known as system optimization.” by McGraw–Hill Dictionary of Scientific and Technical Terms, Fourth Edition, page 1329, 1989. Emphasis added.

Art Unit: 2123

60. Thus, Smith's "optimize" discloses replacing a circuit components and functions with different circuit components and functions, in order to generate solutions in a defined set of possible alternatives.
61. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Smith to modify Abboud. One of ordinary skill in the art would have been motivated to do this in order to apply iterative circuit design optimization procedures to improve the performance of the Abboud circuit.
62. In claim 2, "selecting the apodization circuit" is disclosed by Abboud Abstract "Apodization parameters".
63. In claim 3, "multiplier" is disclosed by Abboud FIG 5 "MULTIPLIER".
64. In claim 4, "memory device where all possible outcomes" is disclosed by Abboud FIG 5 "LOOK UP TABLE".
65. In claim 5, "window function" is disclosed by Abboud Abstract "window algorithm".
66. In claim 6 limitation 1, "apodization circuit" is disclosed by Abboud Abstract "Apodization".
67. In claim 6 limitation 2, "window function" is disclosed by Abboud Abstract "window algorithm".
68. In claim 7 limitation 1, "plurality of transducers" is disclosed by Abboud FIG 1 element 16.
69. In claim 7 limitation 2, "applying an electric pulse to the plurality of transducers" is disclosed by Abboud FIG 1.
70. In claim 7 limitation 3, "measuring the response" is disclosed by Abboud FIG 1.
71. In claim 7 limitation 4, "window function" is disclosed by Abboud Abstract "window algorithm".
72. In claim 8 "multiplier" is disclosed by Abboud FIG 5 "MULTIPLIER".
73. In claim 9 limitation 1, "multiplier" is disclosed by Abboud FIG 5 "MULTIPLIER".
74. In claim 9 limitation 2, "window function" is disclosed by Abboud Abstract "window algorithm".
75. In claim 9 limitation 3, "efficiency" is disclosed by Abboud column 1 line 56 "reducing other extraneous acoustic signals" and column 2 line 14 "Effectively selecting apodization parameters".

Art Unit: 2123

76. In claim 9 limitation 4, “comparing” is disclosed by Abboud column 1 line 56 “reducing other extraneous acoustic signals” and column 2 line 14 “Effectively selecting apodization parameters”.
77. In claim 9 limitation 5, “selecting” is disclosed by Abboud column 1 line 56 “reducing other extraneous acoustic signals” and column 2 line 14 “Effectively selecting apodization parameters”.
78. In claim 10, “window function” is disclosed by Abboud Abstract “window algorithm”.
79. MOTIVATION FOR CLAIMS 2-10. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Smith to modify Abboud. One of ordinary skill in the art would have been motivated to do this in order to apply iterative circuit design optimization procedures to improve the performance of the Abboud circuit.
80. Claims 11-16 are “system” (or “machine”) type claims, and are rejected for the same reasons as “method” claims 1-10 above.
81. Claims 17-21 are “computer usable medium” type claims, and are rejected for the same reasons as “method” claims 1-10 above.

Additional Cited Prior Art

82. The following US patents or publications are hereby cited as prior art, but have not been used for rejection. Applicant should review these carefully before responding to this office action.
83. Dolazza US patent 5,905,692 discloses “An array ultrasound beamformer... transducer array... time multiplexed delay unit... demultiplexed”.
84. Also note the following US patents as disclosing the state of the art, and the terms of art in ultrasound medical imaging: 5922962, 5322068, 5068833, 4821706.

Conclusion

85. All pending claims stand rejected.
86. The Specification and the FIGs are objected to.

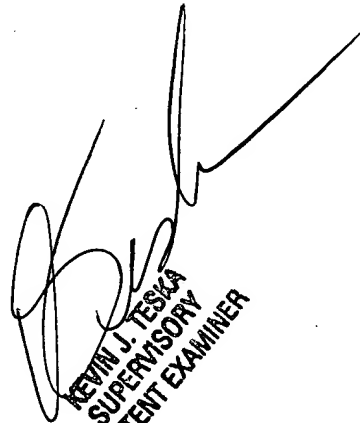
Communication

87. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo Garcia-Otero whose telephone number is 703-305-0857. The examiner can normally be reached on Monday through Thursday from 9:00 AM to 8:00 PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner’s supervisor,

Art Unit: 2123

Kevin Teska, can be reached at (703) 305-9704. The fax phone number for this group is 703-872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.

* * * *



KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER